ABSTRACT OF THE DISCLOSURE

A method and system for etching an organic anti-reflective coating (ARC) layer on a substrate in a plasma processing system comprising: introducing a process gas comprising N_xO_y, wherein x, y represent integers greater than or equal to unity. Additionally, the process chemistry can further comprise the addition of an inert gas, such as a Noble gas (i.e., He, Ne, Ar, Kr, Xe, Rn). The present invention further presents a method for forming a bilayer mask for etching a thin film on a substrate, wherein the method comprises: forming the thin film on the substrate; forming an ARC layer on the thin film; forming a photoresist pattern on the ARC layer; and transferring the photoresist pattern to the ARC layer with an etch process using a process gas comprising N_xO_y, wherein x, y represent integers greater than or equal to unity.